

Control device and method in a home networkFIELD OF THE INVENTION

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The invention relates to a control device and method in a domestic-appliance network.

Domestic appliance should be understood as meaning at least one domestic appliance, such as a video and/or audio appliance (for example, a television set, a tape recorder, a hi-fi system, etc.) and/or at least one electrical appliance (for example, a microwave oven, a refrigerator, a circuit breaker, etc.)

Control of a domestic appliance should be understood as meaning the management of various items of information, such as information allowing the appliance to be set, information relating to the appliance's current operation, information relating to the technical characteristics of the appliance or else safety guidelines which are to be observed.

DESCRIPTION OF RELATED ART

According to the prior art, the information relating to setting, the technical characteristics and the safety guidelines for an appliance is contained in the printed booklet constituting the appliance's instructions. Once this information is known, the user sets the appliance by making adjustments to the appliance itself either directly or, in certain cases, using a remote control.

The information relating to the current operation of an appliance is displayed on the front of the appliance. As non-limiting examples, the front of a compact disc player displays the number of the disc's track number currently being played, or a microwave oven displays the power to which it has been set.

A domestic appliance is thus controlled on the basis of a variety of information which the user employs when making multiple adjustments.

When a user wishes to operate a plurality of domestic appliances simultaneously, he thus has to make adjustments to each of them. The number of operations which the user needs to carry out is thus greatly increased, and this very fact results in real drawbacks. Thus, for example, a user wishing to record a television programme received by a first appliance on a second appliance needs to program each of the appliances separately.

The invention does not have these drawbacks.

15 BRIEF SUMMARY OF THE INVENTION

Specifically, the invention relates to a control device in a domestic-appliance network, wherein each appliance has an associated descriptor comprising a set of HTML pages or page parts for controlling said appliance, said device having

- means for loading and processing descriptors associated with the appliances,
- means for displaying HTML pages or page parts for the descriptors loaded, a descriptor comprising configuration data which identifies an appliance as a source and/or a receiver of a data type, said control device using configuration data for a plurality of appliances to create at least one configuration page in order to allow the user to specify the connections between appliances.

According to one particular illustrative embodiment, the display means comprise a television set. These means can also comprise a video monitor, an LCD or plasma screen, a display of the light-emitting-diode type or another type of display.

According to one particular example, an IEEE 1394 interface, the loading and processing means comprise a microprocessor and a memory. However,

depending on the design, in particular depending on the type of communication bus in the network, the interface can be different and, in particular, wireless. Furthermore, the microprocessor can be replaced by a
5 microcontroller or another type of data-processing device. Similarly, the memory can be of the random access memory or programmable read-only memory type, depending on the type of use envisaged.

According to one particular aspect of the
10 invention, the control device analyses the descriptors obtained to determine similar functions in these descriptors, for example audio volume settings, and creates HTML pages which combine these functions. This characteristic is patentable per se.

15 One advantage of the invention is that it allows various appliances operating at the same time to be controlled centrally.

BRIEF DESCRIPTION OF THE DRAWINGS

20 Other features and advantages of the invention will become apparent on studying embodiments of the invention with reference to the appended figures, in which:

25 - Figure 1 shows a system for controlling domestic equipment using a graphical screen display according to a first embodiment of the invention;

- Figure 2 shows a detailed view of a specific item of domestic equipment according to the invention;

30 - Figure 3 shows a system for controlling domestic equipment using a graphical screen display according to a second embodiment of the invention, and

- Figure 4 shows an improvement to the systems shown in Figures 1 and 3.

35 In all the figures, the same reference symbols denote the same elements.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a system for controlling domestic equipment using a graphical screen display according to a first embodiment of the invention.

The system shown in Figure 1 comprises n items
5 of domestic equipment EQ1, EQ2, ..., EQn, n being an integer greater than or equal to 1.

Each item of domestic equipment (EQj (j = 1, 2, ..., n) is connected to an interface Ij. According to a first embodiment of the invention, the item of domestic
10 equipment EQj and the interface Ij are independent devices connected to one another by means of a connection. According to a second embodiment of the invention, the interface Ij is integrated in the item of domestic equipment EQj in such a manner that all
15 that is formed is a single appliance.

The various interfaces Ij are connected to one another and to a control device CTR by means of an electrical network B. The control device CTR is connected to a display device D. According to the
20 preferred embodiment of the invention, the electrical network B is a data bus, such as the bus defined by IEEE standard 1394.

The display device D may be, for example, a television set or else a computer of the PC (personal
25 computer) type.

For each item of domestic equipment, the information which can be displayed on the screen of the device D is, for example, all or some of the information listed below:

30 - Information allowing the item of domestic equipment to be set and operated. This information can vary from one moment to the next at a greater or lesser rate. It is obtained from instantaneous measurements carried out, for example at regular intervals of time, on the appliance which is operating. For example, it
35 may be information giving the remaining playing time on a track of an audio compact disc or else information giving the temperature of an electric oven.

- Configuration information. This information specifies how various items of domestic equipment can be connected to one another. To show this information on a graphical display, it is necessary to know which are the various items of domestic equipment to be configured so that the chosen configuration(s) can be worked out.

- Technical information describing the item of domestic equipment. This information is not likely to change over time. It is generally set out in a booklet supplied with the equipment. For example, it may be the serial number of the appliance, its rated power consumption, or else its dimensions (height, width, depth).

- Information describing the operating instructions and the safety guidelines for the appliance. This information is traditionally noted in the appliance's instructions.

- Commercial information relating to the manufacturer and/or the distributor of the appliance. For example, this may involve commercial promotions or else additional goods and services linked directly or indirectly to the appliance.

Thus, one advantage of the invention is that it allows a set of very varied information, relating both to a single appliance and to a set of appliances, to be kept centrally at the user's disposal at all times.

According to the invention, the information mentioned above is described, for each item of domestic equipment, as an electronic form in the interface circuit Ij. Electronic form should be understood as meaning a set of computer data which can be communicated by the interface Ij and a set of electronic circuits allowing this computer data to be communicated.

In the description which follows, the set of computer data which can be communicated by the interface Ij will be called the descriptor for the item

of domestic equipment with which the interface Ij is associated.

Thus, another advantage of the invention is that it proposes an electronic means for storing,
5 retrieving and displaying information relating to the domestic equipment.

As mentioned above, the electronic form held in an interface Ij ($j = 1, 2, \dots, n$) is made up of computer data and of means allowing this computer data
10 to be stored and communicated.

The means allowing the computer data to be stored and communicated can be formed merely by memory circuits containing the data. They can also be formed by memory circuits and a microprocessor for more
15 complex applications, such as the creation of documents resulting from a program being executed.

All or some of the computer data is made up of the following data:

- A set of pages and/or page parts using the
20 mark-up language used for creating documents within the hypermedia system commonly called the worldwide web. This mark-up language will subsequently be called HTML (Hyper Text Mark-up Language). These pages thus contain the static information relating to the appliance, that
25 is to say data which does not change over time, and programs allowing this data to be accessed, such as programs known as Java programs and JavaScript programs.

- A set of declarations, or meta-information,
30 allowing all or some of the page parts to be aggregated using the control device CTR. For example, the descriptors for a plurality of appliances can each comprise a volume setting function, which is identified by a particular function type. The controller CTR can
35 thus set up a single page of information containing all the audio volume settings for the appliances in question, by recognizing the function type in the descriptors.

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example, when the data bus defined by IEEE standard 1394 is used, this communication phase can be implemented during the automatic data interchange protocol which takes place when the interface Ij is connected to the bus.

According to another embodiment of the invention, the phase of communicating all or some of the descriptor held in the interface Ij takes place at the request of the control device CTR and may be carried out several times on the basis of the same protocol, should this prove to be necessary.

The descriptor held in an interface Ij can be communicated by the communication protocol used for data interchanges between clients and servers on the worldwide web. This communication protocol will subsequently be called HTTP (Hyper Text Transfer Protocol). According to the invention, however, other communication protocols may be used. For example, the phase of connecting an appliance to the IEEE 1394 bus has a data interchange phase which can be used to this end.

With the hypermedia system commonly called the worldwide web, the HTTP uses the services of a protocol stack commonly called the TCP/IP stack (the acronym TCP/IP stands for «Transmission Control Protocol/Internet Protocol»). The TCP/IP stack is relatively costly to install. One advantage of the invention is that it allows the use of protocols other than those of the TCP/IP stack to support the HTTP.

When all or some of the descriptor is communicated from an interface Ij to the control device CTR, the latter inserts pages and/or page parts in HTML into its tree structure. The «tree structure» of the control device should be understood as meaning the set of pages which the control device allows to be linked to one another and displayed as a result of a graphics or text symbol being activated.

Each page in HTML is identified by an address. According to a first embodiment of the invention, among

the pages in HTML which are inserted into the tree structure of the control device there is at least one header page containing the list of the addresses of the various pages. When consulted, this header page allows
5 any HTML page to be retrieved using the address of the HTML page.

According to another embodiment of the invention, it is also possible to insert into the tree structure of the control device an HTML page assembling
10 a list of pointers, with each pointer corresponding to an address for an HTML page describing the appliance. When consulted, the HTML page assembling the list of pointers thus allows any HTML page to be retrieved using the pointer corresponding to the address of the
15 page.

Advantageously, the HTML page containing the list of the addresses or the HTML page assembling the list of the pointers provide the user with easy access to the various information relating to the appliances
20 used. Furthermore, these HTML pages can be easily modified. It is thus possible to update them, without any difficulty, when a new appliance is connected to the network B.

It is also possible, according to the
25 invention, to create a page listing the appliances connected to the network B. A graphics object formed by a line of text and/or by a drawing can thus be used to indicate the presence of an appliance, which is equivalent to its descriptor being inserted into the
30 tree structure of the control device. This graphics object can be used to direct the user towards new specific pages relating to the appliance. This page is advantageously created by the control device on the basis of the set of descriptors loaded from the
35 appliances.

The use of HTML has the advantage of allowing the user to choose how to show the information which he wishes to display. Thus, for example, this manner of showing information may be made consistent for the same

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kind of information, such as information relating to the audio level of various appliances or information relating to the power consumed by various appliances.

According to an improvement to the embodiment
5 of the invention, an interface Ij can contain a set of declarations allowing the appliance which is associated with it to be configured as a source and/or as a receiver of data, such as audio and/or video data.

The control device CTR then comprises means for
10 creating configuration pages allowing a declaration to be made of which appliance is being used and what its function is (transmitter for a first signal (audio, video, etc.) or data list or receiver for a second list) as well as pages suggesting the possible
15 connections between various appliances or providing the user with a means allowing him to specify the connection or connections which he wishes to set up between various appliances.

As a non-limiting example, a television set can
20 be declared as being an audio transmitter and a hi-fi system can be declared as being an audio receiver. The descriptor for the television set then has a declaration to the effect that the appliance can be an audio source (and also a video signal source, an audio
25 receiver and a video signal receiver, etc.). The control device CTR can then construct a configuration page describing this situation.

When a control unit, such as a remote control, is used, the control device CTR advantageously allows
30 all of the domestic appliances connected to the network B to be controlled.

Control is initiated, in a manner known per se, by the user interacting with a graphics object (text and/or symbol) displayed on the screen of the device D.

35 This interaction is converted into a command by a command program stored in a memory circuit held in the control device. According to the preferred embodiment of the invention, the command program's language is the Java language, for example. According

to other embodiments of the invention, it can also be a command language other than one of the command languages known on the worldwide web. Thus, for example, it may be an extension of HTML. Extension of HTML should be understood as meaning the addition to the HTML of certain keywords whose use syntax conforms to the usual syntax of the HTML.

According to the present embodiment, the following syntax is defined for specifying a volume setting function:

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<COMMAND MIN=0, MAX=100, DELTA=1, LABEL=
'Volume', PROTOCOL='AV/CTS', IDENT='MY IDENTIFIER'>
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where 'COMMAND' denotes the function type, namely a command, MIN and MAX define the minimum and maximum setting values, respectively, DELTA defines the increment, LABEL defines the name to be given to the function, PROTOCOL defines the protocol used to control the appliance in question and IDENT defines an identifier for the appliance calling the function.

Furthermore, the JavaScript language can be used to write the user interaction program.

Using an extension of HTML to cover all or some of the setting commands for the appliances connected to the network B advantageously allows the symbols representing the same kind of commands to be made consistent. This simplifies the control of different appliances.

Initially, the command program for a domestic appliance is held in the interface which is associated with it. When the descriptor is communicated to the control device CTR, the command program is loaded into the control device, which is then able to execute it.

Figure 2 shows a detailed view of a particular item of domestic equipment according to the invention.

The element shown in Figure 2 is made up of an item of domestic equipment EQi and an interface Ii associated with the item of domestic equipment EQi.

As a non-limiting example, the item of domestic equipment EQi comprises three electrical appliances 1,

2, 3, such as those mentioned previously. In a more general way, however, the item of domestic equipment EQi comprises at least one electrical appliance.

5 The electrical appliances 1, 2, 3 are connected to the interface Ii by means of an electrical network b. The electrical network b can be made up of a set of electrical wires, for example.

10 The interface Ii contains all of the descriptors for the appliances 1, 2, 3 as well as various circuits allowing the data passed over the network B to be converted into quantities which are compatible with the electrical appliances.

15 Figure 3 shows a system for controlling domestic equipment using a graphical screen display according to a second embodiment of the invention.

In addition to the elements listed in Figure 1, the control system shown in Figure 3 comprises an item of domestic equipment EQy and an interface Iy.

20 The item of domestic equipment EQy is formed by at least one electrical appliance, such as those mentioned above. The interface Iy contains all of the descriptors for the electrical appliances forming the item of domestic equipment EQy.

25 The interface Iy is then connected directly to the control device CTR by electrical wires. According to this embodiment of the invention, the information interchanged between the electrical appliances forming the item of equipment EQy and the control device CTR is no longer passed over the network B.

30 This embodiment can be particularly advantageous for certain particularly simple electrical appliances, such as circuit breakers, because it is then not necessary to convert simple electrical quantities, such as a voltage value or a current value, into data which is compatible with the network B.

35 According to a particular embodiment, the interface Iy and the control device CTR can then be integrated into a single device DI.

Figure 4 shows an improvement to the system shown in Figures 1 and 3.

In addition to the elements described in Figure 1, the system shown in Figure 4 comprises a
5 modem MD which is connected, on the one hand, to the bus B and, on the other hand, to a network R which is external to the set formed by the domestic equipment EQj, the interfaces Ij, the network B, the control device CTR and the display device D. The network R may
10 be a telephone network, for example.

According to the preferred embodiment of the improvement shown in Figure 4, all or some of the descriptor for at least one item of domestic equipment is communicated by means of a reference commonly used
15 on the worldwide web to specify the physical location of a file or resource. This reference will subsequently be called the URL (Uniform Resource Locator).

The control device can then go and retrieve the required document from the indicated location via the
20 modem MD and the network R using the URL. During this operation, various protocols may be used, such as HTTP, BOOTP, FTP and TFTP. The acronyms BOOTP, FTP and TFTP stand for «Boot Protocol», «File Transfer Protocol» and «Trivial File Transfer Protocol», respectively.

25 HTTP is a relatively costly protocol. Advantageously, it is not imperative for the descriptor communication phase, as mentioned above, to be carried out on the basis of HTTP.

Another advantage of the embodiment shown in
30 Figure 4 is the updating of the information in one or more descriptors for domestic equipment using the modem MD connected to the network R. Advantageously, new information relating to the domestic equipment can thus be made accessible to the user. This updating function
35 is particularly useful, for example, in the case of commercial information such as that mentioned above, or else in the case of information relating to the safety of the appliance.

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808